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PINE MORTALITY IN SHIRTTAIL CREEK CAMPGROUND, FORESTHILL RANGER DISTRICT, TAHOE NATIONAL FOREST

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ABSTRACT

Bark beetles have been causing mortality of ponderosa pine for several years in Shirttail Creek Campground. The present status of mortality is described along with associated factors. Management options are discussed.

INTRODUCTION

Shirttail campground is located on the northshore of Sugar Pine Reservoir. Construction began about 1982 and the final step of surfacing the roads occurred in 1985. The site has a history of top-kill and tree mortality since establishment, and the earliest sequence was evaluated by Forest Pest Management in October 1983 (Report 84-06, Evaluation of Mortality in Sugar Pine Reservoir Campground, Foresthill Ranger District, Tahoe National Forest). The initial mortality was related to site impacts from construction and other factors noted in that evaluation. The latest occurrence of tree mortality was reviewed by John Dale, entomologist, and Susan Frankel, plant pathologist, on March 30, 1988. We were accompanied by Mike Newman, Dick Kastler, and Phil Sexton of the District, and Jane LaBoa, forest silviculturist.

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OBSERVATIONS

Pine mortality is confined to ponderosa pine growing on nonserpentine soils. The principle agents of mortality are the western pine beetle, Dendroctonus brevicomis, and pine engravers, Ips spp. Jeffrey pines on the serpentine areas are not involved because the Jeffrey pine beetle presently is absent from the locale. Two spots of mortality of incense-cedar are present -- one upon serpentine and one in a small drainage upon nonserpentine soils. The foliar symptoms are very similar to the decline of incense-cedar that became apparent in the central Sierra Nevada over the past two years. Flatheaded borers were found under the bark of the dead incense-cedar, but fungal fruiting bodies or other signs of pathogens were not seen and decline appears to be due to environmental stress. This problem may be examined further in this and other areas to determine the extent and cause of mortality.

Dense aggregations of ponderosa pine remain in the drainage within which the campground is located. However, few of the dense campground aggregations mentioned in Report 84-06 remain intact. Approximately 600 trees have been removed or scheduled for removal (Fig. 1). The beginning of crown discoloration indicated additional trees will soon die. The result is a great reduction in shade within the campground.

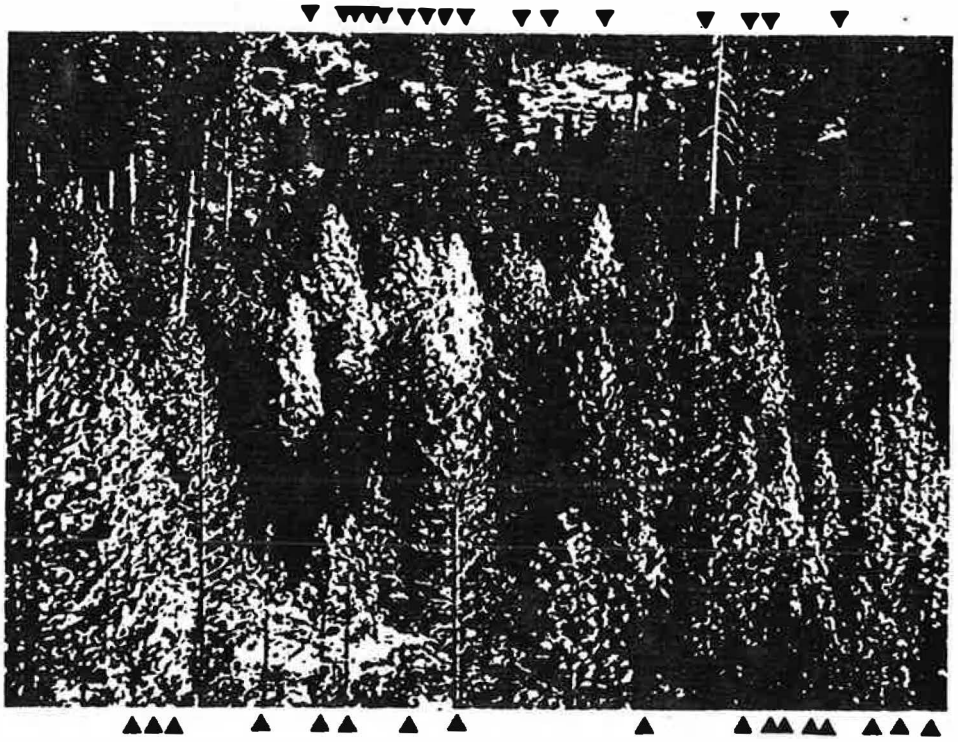

Fig. 1. Ponderosa pines fading after lethal attacks by bark beetles, Shirttail Creek Campground, Foresthill Ranger District, Tahoe National Forest. Arrows denote 33 dead pine in this view of the campground.

At least two mortality spots occurred just below a mining ditch located upslope from the campground. This ditch has water in it once or twice a summer to meet the requirements for claim validity. However, it remained dry in 1986 because a gate blew out the previous winter. The absence of this usual source of midsummer seepage stressed the pines and bark beetles found and killed them.

One small mortality center was observed in nearby Giant Gap Campground. Additional spot kills in the range of 15-20 pines occurred south of the reservoir above Pagge Creek. Two spots of approximately 10 dead trees have appeared in the Volcano Burn plantation uphill from the Shirttail Campground. Other small mortality spots were observed from the road to the reservoir.

The large deficiency in winter precipitation in 1986-87 and 1987-88 has placed forest trees under early stress in 1988. Losses at Shirttail are an extreme of a problem that will be ever more present as the summer and accompanying stress progress. Indeed, current information indicates that the frequency of mortality is accelerating around the state.

DISCUSSION

Report 84-06 warned that future periods of additional stress, such as drought, would cause flare-ups of mortality. In fact, stress and mortality apparently never disappeared completely from the site. Present and past observations indicate that various combinations of pine engravers, western pine beetle, and red turpentine beetle, D. valens, have been moderately to highly active since 1982. The time line below gives a general sequence of events since that year. Stress from construction and high stocking levels created opportunities for insect success. This success was enhanced by snow breakage in late November 1985. All the piles created by the snow breakage were burned or the material chipped, by the fall of 1986.

w snow breakage, November 1985
x snow breakage chipped or burned
y mining ditch dry for summer
z insect salvage piled & covered with plastic

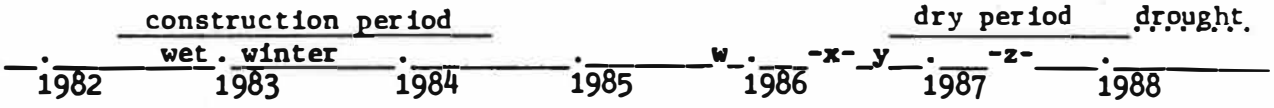

Figure 2. Time line for sequence of events influencing pine mortality caused by bark beetles at Shirttail Creek Campground, Tahoe National Forest.

This raises the question of timeliness of slash disposal. Snow breakage may have contributed to sustaining the mortality. Burning or chipping is of little utility if pine engravers successfully complete development of a generation

before the slash is treated. Snow breakage or slash always should be examined to see if insects are present and the state of development of the brood. Green material without parent beetles or brood should be rendered incapable of sustaining insect development. Material with brood should be treated in a manner lethal to the progeny before emergence. An example is the large amount of slash observed at the Foresthill Breeding Arboretum on March 30. Large numbers of pine engravers were just beginning to lay eggs in this material, and it was essential to destroy the potential of the next generation. The slash was burned on April 13 to protect the surrounding pine plantation. Material from which the brood has emerged need not be manipulated for insect suppression. This kind of slash is suitable for wildlife piles or for use as firewood.

MANAGEMENT ALTERNATIVES

The following is a partial reiteration of Report 84-06.

1. Do Nothing. This alternative is moot for the campground because something is being done in and near the campground -- dead trees are being salvaged. In those areas of the drainage upstream and upslope from the campground where no entry has taken place, mortality spots probably will develope throughout the summer. Aggregates with high levels of stocking will be most at risk, but the drought may result in a leveling in risk between stocking levels. Anticipating new mortality locations is frustrating, but past experience in the area may point to likely spots.

2. Salvage Dead Trees Immediately. Removing dead trees during the winter and early spring has the potential for a limited reduction in mortality by removing overwintering beetles. This assumes a high level of detection of green infested trees.

During the summer of 1988, western pine and pine engraver beetles are likely to have flown by the time infested pines begin to fade. Therefore, infested trees must be detected and felled while the brood remains in the trees if limbs and stems are to be treated to kill brood. This will require frequent inspections. Pitch tubes of western pine beetle frequently are small and difficult to detect with binoculars when located just below or in the crown of large trees. In drought years they may even be absent. Pitch tubes of red turpentine beetle, boring dust of engravers in bark cracks, and lower bole attacks of western pine beetle, would be relied upon for detection. In other words, timely removal of trees to decrease mortality is difficult under current climatic conditions and population levels.

Western pine beetles undergo a pre-attack flight and those emerging within the campground probably will initiate attacks outside the campground now that the number of trees (opportunities for attack) within the campground has been greatly reduced. Unfortunately, the amount of mortality in the drainage is markedly increasing, and these numbers increase the likelihood of further mortality within the campground.

Entry to remove trees could result in impacts detrimental to leave trees, and unless the trees can be removed prior to beetle emergence, more harm than good may result. Dead trees will still cast shade as long as the needles remain

intact. Trees will not become hazardous before campground closure, after which salvage would occur.

3. High-risk Tree Removal and Sanitation. Unknown is the number of pines that evinced stress or poor vigor during or after construction. The level certainly has been reduced by beetle activity and subsequent tree removal. The gain to be realized by removing any additional high risk trees should be weighed against aggrevating stress on nearby leave trees through increased insolation, soil compaction and potential wounding. Removal would become more difficult once the campground has opened for recreational use.

4. Thin Overstocked Aggregations. The beetles have done some of the thinning suggested in 1984. A more regulated thinning to include some adjoining noncampground areas would be beneficial. Thinning should be done in the fall when bark beetle activity subsides, so that the associated disturbance does not predispose leave trees to attack. Care should be taken not to damage leave trees or compact soils.

Any aggregations remaining in the campground could be thinned to make shading and appearance more uniform throughout the development. Otherwise, preference of the recreationist for the environment of the aggregations may result in impacts that increase stress within the aggregations.

5. Protect Trees with Insecticide. Ponderosa pine can be given some protection from western pine beetle attack for up to a year by a hydraulic application of Sevin 50W or 80S, or lindane (restricted use insecticides). Hydraulic spraying is feasible for the lower 30 ft, or higher, if a bucket truck has access to the trees, which is sometimes possible in campgrounds. This protection would not prevent top-killing by pine engravers. Attacks by western pine beetle within the crowns of taller trees might also remain undeterred. Treatment could protect high value trees until vigor returns.

6. Treat Slash. Slash treatment is well covered in Report 84-06. Slash from Shrittail Creek should not be moved to or near Giant Gap or any other recreation site. Artificially increasing beetle populations would only aggrevate naturally occurring situations. As was done in 1987, slash could be piled in openings and covered with clear plastic to generate interior temperatures lethal to beetles and brood. Piles should be located to receive as much insolation as possible. An asphalt or gravel area would result in higher temperatures, but the treatment might not be completed before the opening of the campground. Piles could become objects of curiosity for campers. Any disturbance in the plastic cover could well negate the treatment before insect mortality occurs.

7. Treat Stumps with Borax. Stumps created by salvage presently are treated with borax and the practice should be extended to stumps associated with thinning when they exceed 8 inches in diameter.

8. Irrigation. The campground has a source of water from an upstream diversion of Shirttail Creek. Use of this source for deep irrigation of selected high value trees or areas would be very beneficial for improving vigor to ward off insect attack. Temporary plastic lines were used under similar conditions in a campground in Sequoia-Kings Canyon National Park. The system was signed to explain the reasons to the camping public. The system was

undisturbed and the public was educated to the relationship between bark beetle attack and tree vigor. No trees were lost after the beginning of irrigation.

The mining ditch upslope from the campground has water in it once or twice a summer. It may be possible to siphon some water from the ditch during periods of use under agreement with the mining company.

9. Combination of Alternatives. Alternatives are not mutually exclusive and may be used in various combinations to meet management objectives.